Suspended electrodialytic extraction of toxic elements for detoxification of three different mine tailings - DTU Orbit (17/08/2019)

Suspended electrodialytic extraction of toxic elements for detoxification of three different mine tailings

Environmental effects of mining activities partly originate from the production of tailings, and the exposure of these to ambient physical and chemical conditions. Removal of toxic elements from tailings prior to deposition could improve environmental performance and reduce risks. Experimental results have shown that electrokinetic treatment can remove Cd, Cu, Pb, and Zn from tailings soils; As from tailings; and Cu from tailings. Still, however, a major concern is the long treatment-time required for the element-transport through the tailings matrix. Therefore several enhancement methods have been investigated including pre-treatment of the tailings with acid; insertion of bipolar electrodes; and implementation of pulsed or sinusoidal electric fields. In line with these efforts, we investigated the efficiency when extracting toxic elements from a suspension of tailings, rather than from a solid matrix, which could well be implemented as a final treatment step prior to deposition of tailings. Six electrodialytic experiments in laboratory scale with three different mine tailings (Codelco, Zinkgruvan, and Nalunaq) show that it is possible to extract residual Cu from the all the three suspended mine tailings, although with some difference between the tailings. From the Zinkgruvan sediment, which had the lowest Cu removal, Pb could also be extracted, while Cd and Zn were less extractable.

General information
Publication status: Published
Organisations: Department of Civil Engineering, ARTEK, Section for Arctic Engineering and Sustainable Solutions, Universidad Tecnica Federico Santa Maria
Contributors: Jensen, P. E., Ottosen, L. M., Hansen, H., Bollwerk, S., Belmonte, L. J., Kirkelund, G. M.
Pages: 119-127
Publication date: 2016
Peer-reviewed: Yes

Publication information
Volume: 11
Issue number: 2
ISSN (Print): 1743-7601
Ratings:
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 0.4 SJR 0.166 SNIP 0.355
Original language: English
Keywords: Decontamination, Detoxification, Electrodialysis, Heavy metals, Mine tailings, Remediation, Resource recovery
Electronic versions:
SDP110203f.pdf
DOIs: 10.2495/SDP-V11-N2-119-127
URLs:
http://www.witpress.com/elibrary/sdp-volumes/11/2
Source: PublicationPreSubmission
Source-ID: 125833304
Research output: Contribution to journal › Conference article – Annual report year: 2016 › Research › peer-review